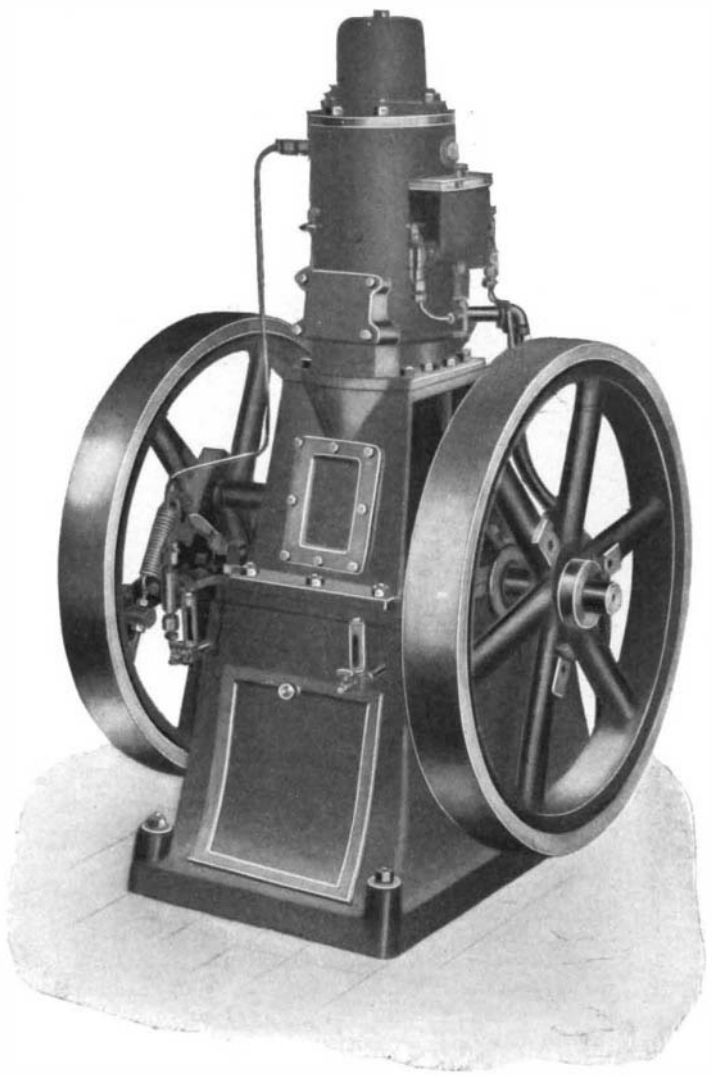
A SIMPLE KEROSENE ENGINE.

Considerable improvement has been made in the past few years in the utilization of kerosene oil as a motive power for combustion engines. Kerosene oil can be had almost anywhere, and on this account the problem of supplying a cheap small power is greatly simplified. Our illustrations show a new type of kerosene engine recently introduced, which has the merit of simplicity in a remarkable degree. It is of the two-cycle type, in which an explosion occurs in the cylinder at every revolution of the crankshaft; but its two most important features are that it operates without valves, and that the oil is forced by means of a small pump into the cylinder in the form of a spray through a suitable nozzle at the instant the piston begins to descend on its downward stroke, thereby avoiding premature explosions. Referring to the diagram, it will be noticed that the ignition is accomplished by the usual ignition hot tube or dome *D* at the upper end of the cylinder, the dome being protected by a damper cap to prevent heat radiation after the engine is started. A concentric cap fits over the inner cap. When both apertures coincide, the heating lamp for starting is placed inside; after starting, the outer cap is rotated till the apertures are covered.



A VALVELESS KEROSENE ENGINE.

The operation of the engine is as follows: the ignition dome *D* is heated for five minutes or more by a Primus kerosene blue-flame torch, then the handle of a small oil pump (seen on the left-hand side in the larger engraving) is operated a few times, to force the oil up from the tank *T* through the nozzle *O* into the cylinder *F*. One or two quick turns of the flywheel are given, then the engine starts.

On the up-stroke of the piston *P*, air is drawn in through two holes *A* in the base, and follows the piston through the port *B* into the crankcase *C* as soon as the piston uncovers the port. On its descent the piston slightly compresses this air in the crankcase until its upper end uncovers the exhaust *E* and also the air inlet *I*, then the exhaust gases pass out of *E*, and by the curved top of the piston the air from the crankcase is projected upward at the same time into the cylinder and locked there upon the upward stroke of the piston *P*, which closes the air inlet *I* and exhaust port *E*.

The air in the cylinder is then further compressed and heated by the continuation of the up-stroke of the piston, and just as the latter is about to descend a minute quantity of kerosene is injected by the oil feed pump and is immediately vaporized and mixed with the air, forming an explosive mixture that is in turn ignited by the hot dome *D*, the explosion driving the piston downward. The combustion is so perfect that the cylinder always remains clean and the piston is never clogged by soot. There is thus a positive entrance of the air and oil to the cylinder in regular sequence. *G* is an oil well for one of the main bearings, and *H* is a faucet for drawing off the oil collecting in the bottom of the crankcase.

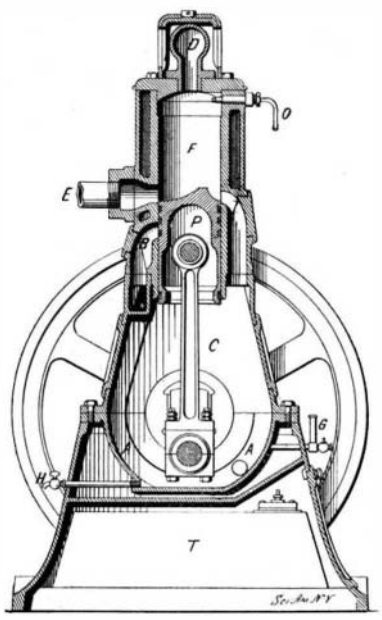
The tank containing the lubricating oil is located on the outside of the engine near the upper end, from which two small feed pipes lead, one for lubricating the cylinder, the other for the centrifugal oiler, which carries the oil through a small hole (not shown) in the center of the crankshaft to oil the crankpin. In this way oiling by the usual splash system is avoided.

The main-shaft bearings are fitted with the latest type of ring oilers, having glass cups, and it is said only require filling but once a month. The exhaust from the engine is smokeless and odorless, provided the right quantity of oil is used for lubrication.

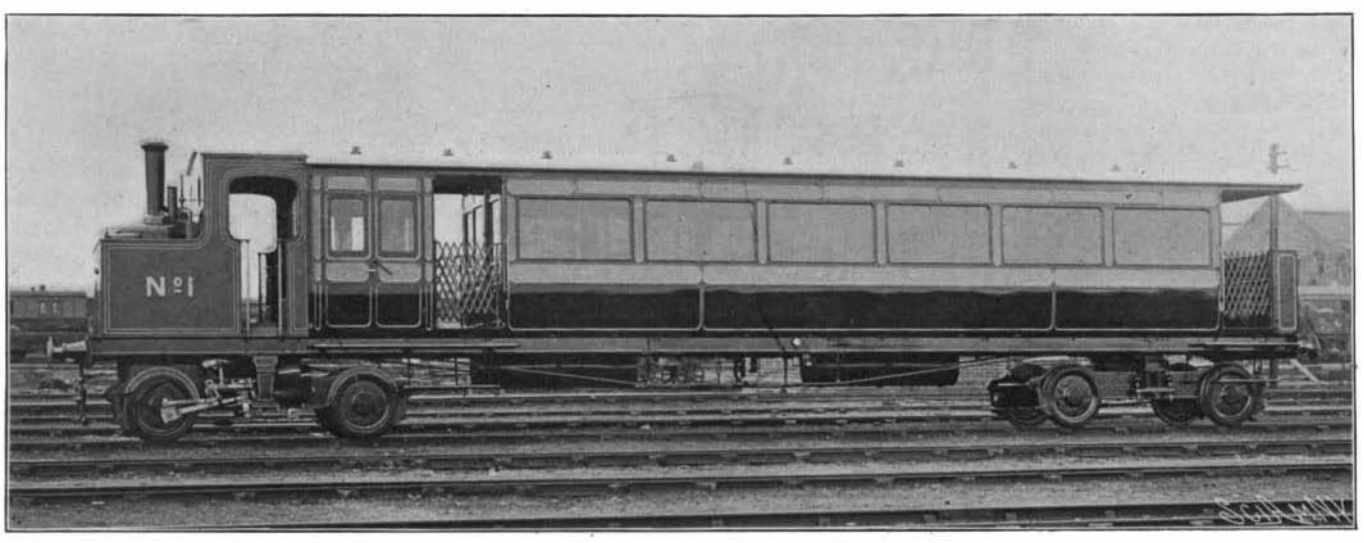
An eccentric on the main shaft with a variable throw, regulated by an exceedingly simple governor, changes the stroke of the oil-feed pump to suit the load. The engine responds very quickly to the varying quantities of fuel it receives, and the governing action is consequently positive and very close. This results in high efficiency, and makes it possible to obtain a brake horse power with 0.7 to 0.8 pound of oil, or a little less than a pint, which weighs about 0.85 pound. The Diesel engine, which is the most economical one made, consumes 0.45 to 0.55 pound of oil per brake horse power.

It will thus be seen that the American engine compares very favorably with it. When running with a three-quarters load, the engine consumes slightly less oil per horse power than when carrying a full load. In other words, it shows the highest efficiency at three-quarters load, and then requires a consumption of about one-tenth gallon of oil per horse power per hour. If stopped, the engine can be started within five minutes without reheating. We are advised that the engine has lately been introduced by the American and British Manufacturing Company, and is now manufactured at the Ordnance works of the company at Bridgeport, Conn.

The model we saw in operation showed fully five brake horse power, and easily carried a load of sixty 16 candle power incandescent electric lamps. The engine can be started to run in either direction as may be desired, and is so simple that it can be managed by a person of ordinary intelligence.



SECTIONAL ELEVATION OF KEROSENE ENGINE.



MOTOR COACH BUILT FOR THE LONDON AND SOUTH-WESTERN RAILWAY.

MOTOR COACHES FOR BRITISH RAILROADS.

BY THE ENGLISH CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

Now that the automobile has asserted its superiority over other systems of rapid locomotion upon the highroads, and the engines for propelling the vehicles have been developed to a high standard of efficiency, the adaptation of the motor car to railroads is being seriously considered. In Great Britain several attempts are being made to introduce the motor-propelled vehicle upon certain branches of the railroads. Although the North-Eastern Railway Company was the first to decide upon the innovation, the first actual coach built upon these principles for use has been constructed conjointly by the London and South-Western Railroad and the London, Brighton, and South Coast Railroad, two trunk lines operating in the south of England.

The self-propelled motor coach possesses many advantages over the existing system for some phases of railroad working, the most obvious of which is its utilization as a feeder to the through lines. Some branch lines extending through sparsely-populated areas cannot be profitably operated, although a train service is absolutely necessary. It is for such exigencies that the self-propelled motor coach is peculiarly suitable, since the cost of maintenance is much less than that of a fully-equipped train.

The experimental coach constructed by the London and South-Western and the London, Brighton and South Coast Railroads, a photograph of which we are enabled to publish herewith through the courtesy of Mr. Drummond, the chief engineer to the former railroad, is intended for service between Fratton and Havant, a short line on the south coast joining the main trunk systems of the respective companies.

This coach consists of practically an ordinary passenger vehicle, with a small space allotted in the fore part for the accommodation of the motor. The latter in this instance is of the steam type. The coach is 56 feet in length over all, including the engine. It is carried upon two four-wheeled bogie trucks, the driving mechanism being attached to the two fore wheels of the front bogie. The passenger accommodation is divided into two compartments, one for first-class, and the other for third-class passengers. The compartment for the latter has a capacity for 32 passengers, the seats being arranged in the manner that prevails in American cars, on each side of the gangway, which extends through the center of the car. The first-class compartment is built to seat ten passengers, the seats in this instance being arranged longitudinally on either side of the car. Between the space reserved for the passengers and the motor is a small space for the conveyance of ten tons of baggage. The boiler, to economize space, is of the vertical type. The front pair of wheels of the fore bogie truck, as already stated, are the drivers, the cylinders being of 7-inch diameter and 10-inch stroke. A cab is provided for the engineer and his fireman. As will be recognized from our illustration, the motor has been compressed in as small a space as possible, and the general arrangement of the vehicle is very ingenious. The coach has been designed with the idea of attaining a speed of 30 miles an hour in half a minute after starting. There is no doubt that this class of self-propelled motor coach